Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1. (*Currently amended*) A synthetic gene encoding a polypeptide segment, wherein said polypeptide segment ~~that~~ corresponds to a reference polypeptide segment encoded by a naturally occurring gene, and ~~wherein the polypeptide segment-encoding sequence of the synthetic gene is different from the polypeptide segment-encoding sequence of said naturally occurring gene, wherein~~

a) the polypeptide segment encoded in the synthetic gene and the polypeptide segment encoded by the naturally occurring gene are the same length and comprise at least 50 amino acids;

b) the polypeptide segment encoded in the synthetic gene and the polypeptide segment encoded by the naturally occurring gene are at least 95% identical in amino acid sequence; and

c) ~~said~~ the polypeptide segment-encoding sequence of ~~said~~ the synthetic gene and the polypeptide segment-encoding sequence of ~~said~~ the naturally occurring gene ~~is~~ are less than ~~about~~ 90% identical in nucleotide sequence ~~said polypeptide segment-encoding sequence of said naturally occurring gene~~

~~b) said polypeptide segment-encoding sequence of said synthetic gene comprises at least one unique restriction site that is not present or is not unique in the polypeptide segment-encoding sequence of said naturally occurring gene, and~~

~~c) said polypeptide segment-encoding sequence of said synthetic gene is free from at least one restriction site that is present in the polypeptide segment-encoding sequence of said naturally occurring gene~~.

2. (Original) The synthetic gene of claim 1 wherein the polypeptide segment is from a polyketide synthase (PKS).

3. (Original) The synthetic gene of claim 2 wherein the polypeptide segment comprises a PKS domain selected from AT, ACP, KS, KR, DH, ER, and TE.

4. (Original) The synthetic gene of claim 3 that encodes one or more PKS modules.

5. (Original) The synthetic gene of claim 4 comprising at most one copy per module-encoding sequence of a restriction enzyme recognition site selected from the group consisting of Spe I, Mfe I, Afi II, Bsi WI, Sac II, Ngo MIV, Nhe I, Kpn I, Msc I, Bgl II, Bss HII, Sac II, Age I, Pst I, Kas I, Mlu I, Xba I, Sph I, Bsp E, and Ngo MIV recognition sites.

6. (Original) The synthetic gene of claim 1 wherein the polypeptide segment-encoding sequence of the synthetic gene is free from at least one Type IIS enzyme restriction site present in the polypeptide segment-encoding sequence of said naturally occurring gene.

7. (Previously presented) A synthetic gene of claim 1 encoding a polypeptide segment that corresponds to a reference polypeptide segment encoded by a naturally occurring PKS gene, wherein the polypeptide segment-encoding sequence of the synthetic gene is different from the polypeptide segment-encoding sequence of said naturally occurring PKS gene and comprises at least two of:

a) a Spe I site near the sequence encoding the amino-terminus of the module;

b) a Mfe I site near the sequence encoding the amino-terminus of a KS domain;

c) a Kpn I site near the sequence encoding the carboxy-terminus of a KS domain;

d) a Msc I site near the sequence encoding the amino-terminus of an AT domain;

e) a Pst I site near the sequence encoding the carboxy-terminus of an AT domain;

f) a BsrB I site near the sequence encoding the amino-terminus of an ER domain;

g) an Age I site near the sequence encoding the amino-terminus of a KR domain;

h) an Xba I site near the sequence encoding the amino-terminus of an ACP domain.

8. (Original) A vector comprising a synthetic gene of claim 1.

9. (Original) The vector of claim 8 that is an expression vector.

10. (Original) A library of vectors each comprising a synthetic gene of claim 1.

11. (Original) The vector of claim 8 that comprises an open reading frame encoding a first PKS module and one or more of:

a) a PKS extension module;

b) a PKS loading module;

c) a thioesterase domain; and

d) an interpolypeptide linker.

12. (Original) A cell comprising an expression vector of claim 9.

13. (Original) The cell of claim 12 comprising a polypeptide encoded by the vector.

14. (Currently amended) The cell of claim 13 that comprises a functional polyketide synthase (PKS), wherein said PKS comprises a polypeptide encoded by said vector.

15. (Original) A method of making a polyketide comprising culturing a cell of claim 14 under conditions in which a polyketide is produced, wherein the polyketide would not be produced by said cell in the absence of said vector.

16. (Withdrawn) A gene library comprising a plurality of different PKS module-encoding genes, wherein the module-encoding genes in the library have at least one restriction site in common, said restriction site is found no more than one time in each module, and the modules encoded in said library correspond to modules from five or more different polyketide synthase proteins.

Claims 17-43. (Cancelled)

44. (Withdrawn) A method for making a synthetic gene encoding a PKS module, comprising

(i) producing a plurality of DNA units by assembly PCR, wherein each DNA unit encodes a portion of said PKS module;

(ii) combining said plurality of DNA units in a predetermined sequence to produce PKS module-encoding gene.

Claims 45-50. (Cancelled)

51. (Withdrawn) A method for designing a synthetic gene, the method comprising the steps of:

providing a reference amino acid sequence;

reverse translating the amino acid sequence to a randomized nucleotide sequence which encodes the amino acid sequence using a random selection of codons which have been, optionally, optimized for a codon preference of a host organism;

providing one or more parameters for positions of restriction sites on a sequence of the synthetic gene;

removing occurrences of one or more selected restriction sites from the randomized nucleotide sequence; and

inserting one or more selected restriction sites at selected positions in the randomized nucleotide sequence to generate a sequence of the synthetic gene.

Claims 52-68. (Cancelled)

69. (Previously presented) The synthetic gene of Claim 1 wherein the polypeptide segment-encoding sequence of said synthetic gene is less than about 85% identical to said polypeptide segment-encoding sequence of said naturally occurring gene.

70. (Previously presented) The synthetic gene of Claim 1 wherein the polypeptide segment-encoding sequence of said synthetic gene is less than about 80% identical to said polypeptide segment-encoding sequence of said naturally occurring gene.

71. (Previously presented) The synthetic gene of Claim 1 wherein the polypeptide segment-encoding sequence of said synthetic gene is less than about 70% identical to said polypeptide segment-encoding sequence of said naturally occurring gene.

72. (Previously presented) The synthetic gene of Claim 1 that is 1000-10,000 nucleotides in length.

73. (Previously presented) The synthetic gene of Claim 1 that is 3000-10,000 nucleotides in length.

74. (Previously presented) The synthetic gene of Claim 1 wherein the polypeptide segment encoded by the synthetic gene corresponds to at least 100 contiguous amino acid residues encoded by the naturally occurring gene.

75. (Currently amended) A synthetic gene encoding a polypeptide ~~segment that corresponds to a reference polypeptide segment~~ encoded by a naturally occurring gene, ~~wherein the polypeptide segment-encoding sequence of the synthetic gene is different from the polypeptide segment-encoding sequence of said naturally occurring gene,~~ wherein ~~said~~ the nucleotide ~~polypeptide segment-encoding~~ sequence of ~~said~~ the synthetic gene is less than about 90% identical to ~~said~~ the nucleotide ~~polypeptide segment-encoding~~ sequence of ~~said~~ the naturally occurring gene.

76. (Previously presented) The synthetic gene of Claim 1 that is produced by a method comprising:

a) providing a first set of DNA units, each in a first-type selectable vector comprising a first selectable marker and providing a second set of DNA units, each in a second-type selectable vector comprising a second selectable marker different from the first,

wherein said first-type and second-type selectable vectors can be selected based on the different selectable markers, and,

wherein the each DNA unit encodes an amino acid sequence of a portion of the polypeptide segment, such that when they are joined in order the resulting synthetic gene encodes the polypeptide segment;

b) recombinantly joining a DNA unit from the first set with an adjacent DNA unit from the second set to generate a first-type selectable vector comprising a third DNA unit, and obtaining a desired clone by selecting for the first selectable marker

c) recombinantly joining the third DNA unit with an adjacent DNA unit from the second set to generate a first-type selectable vector comprising a fourth DNA unit, and obtaining a desired clone by selecting for the first selectable marker, or

recombinantly joining the third DNA unit with an adjacent DNA unit from the second series to generate a second-type selectable vector comprising a fourth DNA unit, and obtaining a desired clone by selecting for the second selectable marker.

77. (New) The synthetic gene of claim 1, wherein the seqment-encoding sequence of the synthetic gene has the same sequence as the seqment-encoding sequence of the naturally occurring gene.

78. (New) The gene of claim 1 wherein the polypeptide encoded by the synthetic gene has at least 95% sequence identity with the naturally occurring polypeptide.

79. (New) The gene of claim 1 wherein the polypeptide encoded by the synthetic gene has at least 97% sequence identity with the naturally occurring polypeptide.

80. (New) The gene of claim 1 wherein the polypeptide encoded by the synthetic gene has same sequence as the naturally occurring polypeptide.

81. (New) The synthetic gene of claim 1 wherein the reference polypeptide segment is at least 100 residues in length.

82. (New) The synthetic gene of claim 1 wherein the polypeptide segment-encoding sequence of said synthetic gene comprises from 500 to 50,000 basepairs

83. (New) The synthetic gene of claim 82 wherein the polypeptide segment-encoding sequence of said synthetic gene is from 3000 to 10,000 basepairs

84. (New) The synthetic gene of claim 82 wherein the polypeptide segment-encoding sequence of said synthetic gene is from 5000 to 20,000 basepairs

85. (New) A synthetic gene comprising from 5,000 to 50,000 basepairs encoding a polypeptide segment that corresponds to a reference polypeptide segment encoded by a naturally occurring gene, wherein the polypeptide segment-encoding sequence of the synthetic gene is different from the polypeptide segment-encoding sequence of said naturally occurring gene, wherein

a) the polypeptide segment encoded in the synthetic gene and the polypeptide segment encoded by the naturally occurring gene are at least 97% identical in amino acid sequence; and

b) the polypeptide segment-encoding sequence of the synthetic gene and the polypeptide segment-encoding sequence of the naturally occurring gene is are less than 80% identical in nucleotide sequence.

c) the polypeptide segment-encoding sequence of the synthetic gene comprises at least one unique restriction site that is not present or is not unique in the polypeptide segment-encoding sequence of said naturally occurring gene, and

d) the polypeptide segment-encoding sequence of the synthetic gene is free from at least one restriction site that is present in the polypeptide segment-encoding sequence of said naturally occurring gene.

86. (New) A synthetic gene produced by a process comprising

a) obtaining the DNA sequence of a naturally occurring gene;

b) obtaining a first amino acid sequence of at least 100 amino acids encoded by the naturally occurring gene;

c) synthesizing a nucleic acid that encodes a second amino acid sequence of at least 100 amino acids, wherein

i) said second amino acid sequence is at least 95% identical to the first amino acid sequence and

ii) the naturally occurring sequence encoding said first amino acid sequence has less than 80% sequence identity to the synthetic sequence encoding said second amino acid sequence.

87. (New) The synthetic gene of claim 86 wherein said second amino acid sequence is at least 97% identical to the first amino acid sequence.

88. (New) A synthetic gene encoding a protein at least 100 amino acids in length, produced by a process comprising

a) obtaining the DNA sequence of a naturally occurring gene encoding a naturally occurring protein;

b) obtaining the first amino acid sequence of the naturally occurring protein;

c) designing an artificial DNA that has less than 80% nucleotide identity with the naturally occurring gene and which encodes a polypeptide with at least 95% sequence identity with the naturally occurring protein

d) synthesizing a nucleic acid comprising the sequence of the artificial DNA.

89. (New) The synthetic gene of claim 88 wherein said second amino acid sequence is at least 97% identical to the first amino acid sequence.

90. (New) A synthetic gene encoding a polypeptide segment, wherein said polypeptide segment corresponds to a reference polypeptide segment encoded by a naturally occurring gene, and

a) the polypeptide segment encoded in the synthetic gene and the polypeptide segment encoded by the naturally occurring gene are the same length and comprise at least 50 amino acids;

b) the polypeptide segment encoded in the synthetic gene and the polypeptide segment encoded by the naturally occurring gene are at least about 95% identical in amino acid sequence; and

c) the polypeptide segment-encoding sequence of the synthetic gene and the polypeptide segment-encoding sequence of the naturally occurring gene are less than about 90% identical in nucleotide sequence.